

American Automobile Manufacturers Association



ANDREW H. CARD, Jr.
President and Chief Executive Officer

S95-10
July 27, 1995

Mr. William F. Caton, Acting Secretary
Federal Communications Commission
1919 M Street N.W., Room 222
Washington, DC 20554

DOCKET FILE COPY ORIGINAL

Dear Mr. Caton:

**RE: Supplemental Comments to - Federal Communications Commission, ET
Docket No. 94-124 - International Harmonization for Frequencies Above 40 GHz**

The American Automobile Manufacturers Association (AAMA) submits the following supplemental comments for FCC review as identified in the FCC 23 June 1995 Public Notice for "*International Harmonization of Frequency Bands Above 40 GHz (ET Docket No. 94-124)*".

The automotive industry is global in nature and U.S. vehicle manufacturers market products throughout the world. Efforts to harmonize test procedures, regulations, and other common elements such as electromagnetic spectrum utilization can be beneficial to the public. As a result of harmonization, the public will receive the benefits of worldwide technology availability; commonality of test procedures, component parts, and service; and ultimately lower cost and higher reliability than would result if manufacturers had to meet distinct standards for each jurisdiction.

In the case of electromagnetic spectrum usage for vehicular radar systems, the public would benefit because there would be a reduction in worldwide compatibility concerns with other electronic products operating in the same or adjacent frequencies. With recent advances in technology above 40 GHz, now is the time to achieve necessary harmonization with other nations for future applications.

The AAMA strongly supports harmonizing the use of frequency bands for vehicular radar and other applications. AAMA continues to be an active participant in the United Nations ECE Working Party 29 and its committees that harmonize vehicular test procedures for safety, acoustics and emissions. AAMA members participate in the CISPR (Comité International Spécial des Procédures des Radioélectroniques) and ISO (International Standards Organization) electromagnetic activities. CISPR has developed a worldwide test procedure concerning emissions from vehicles and related equipment. AAMA member company employees currently

HEADQUARTERS

1401 H Street, N.W. Suite 900, Washington, D.C. 20005

202•326•5500 FAX 202•326•5567

DETROIT OFFICE

7430 Second Avenue, Suite 300, Detroit, MI 48202

313•872•4311 FAX 313•872•5400

No. of Copies rec'd 0812
List A B C D E

chair the U.S. Society of Automotive Engineers Electromagnetic Compatibility Committee and serve as the U.S. representative to the CISPR D subcommittee and as delegates to ISO/TC22/SC3/WG3.

Historically, U.S. vehicle manufacturers and European manufacturers have participated in harmonization whenever possible. The U.S. automobile industry strives for commonality with the European automobile industry as vehicles are produced and sold for both markets, regardless of whether they are produced in Europe or the United States. As part of the AAMA deliberations in assessing frequency allocation for vehicular radars, we actively solicited information on frequency allocations around the world.

The European community is actively developing vehicular radar systems and has established the “*European Automotive Radar Specifications Group*” and the “*European Automotive Radar Standards Group*”. A copy of the European Automotive Radar Specifications Group Meeting Report of 20 September 1994 is attached (Enclosure 1). As part of the 20 September 1994 report, Appendix 2 Draft Specifications, transmitter output frequency is specified as 76 - 77 GHz.

In Germany, the Bundesamt für Post und Telekommunikation (Federal Ministry for Mail and Telecommunications 5300 Bonn, 1, Germany) issued a licensing regulation: *Voriäufige Zulassungsvorschrift für Funkanlagen des nichtnavigatorischen Ortungsfunkdienstes in der Verwendung als Bewegungsmelder kleiner Leistung, Ausgabe: Juni 1992* (Enclosure 2). The technical requirements section of this regulation: Page 7, Section 2 TECHNICAL REQUIREMENTS, 2.1.1 D) 76.00 ... 77.00 GHz 2 states this frequency band is: “*Permitted only for distance warning labels (anti-collision radar devices)*”

The European test procedure development and regulation to allocate the 76-77 GHz band for automotive radar systems and the FCC approval of the same band in the United States would permit harmonization for this important function. AAMA recommends and encourages the FCC to continue the harmonization of the 76-77 GHz band, and to initiate harmonization of the 95 and 152 GHz bands.

As stated earlier, the U.S. automobile industry strives for commonality with the European automobile industry as vehicles are produced and sold for both markets. There were requests from one country for an automotive radar band at 60 GHz. In previously submitted, related comments, the 60 GHz band will not meet U.S. market expectations nor is that band harmonized with the proposed European standard. Also, the number of vehicles shipped from the U.S. and Europe to the country requesting the 60 GHz band is extremely small, unlike the great number of vehicles shipped between the U.S. and Europe. Harmonization would be more readily achieved utilizing the 76 -77 GHz band proposed in Europe and by the FCC, and requested by the AAMA.

In summary, AAMA recommends that the FCC:

1. Issue a final rule for the utilization of the 76 -77 GHz band as soon as possible,
2. Pursue worldwide harmonization of all of the radar bands requested by AAMA, and
3. Issue a final rule for the remaining vehicular radar bands on a timely basis.

Please contact Ron Wasko of my staff at 313/871-6335 if you require additional information concerning any aspect of the AAMA comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Vann H. Wilber", with a long horizontal flourish extending to the right.

Vann H. Wilber, Director
Vehicle Safety and International Dept.
Engineering Affairs Division

Enclosures (2)

Redhill
4 October 1994

PHILIPS RESEARCH LABORATORIES

European Automotive Radar Specifications Group Meeting

Venue: Marconi Radar and Control Systems, Frimley, UK
Date: 20 September 1994

Present

T. Beadman	Mira
P. Blakelock	GEC-Plessey Semiconductors
W. Chodynietki	Jaguar Cars Ltd
D. Cooper	University Of Birmingham
C. Evans	MRCS
J. Flacke	Dornier GmbH
G. Gieduld	Leica
E. Hoare	University Of Birmingham
A. Hoess	Siemens
E. Lissel	Volkswagen
P. Lowbridge	GEC-Plessey Semiconductors
P. Ouyard	Dassault Electronique
H. Pfizenmaier	Bosch
P. Relph	Philips Research Laboratories
B. Rickett	Roke Manor Research
E. Sansom	MRCS
R. Shearman	University Of Birmingham

1. Introduction to Marconi Radar and Control Systems

E. Sansom gave welcomed the attendees to the meeting and gave a brief introduction to the activities at Marconi Radar and Control Systems.

2. Agreement Of Previous Minutes

Acting Chairman P. Lowbridge stressed that the triangular FM modulation scheme quoted in the previous minutes was not restrictive and that it was the opinion of the group that any modulation scheme should be allowed. The proposed agenda for the meeting was agreed and is reproduced in appendix 1.

16

3. Review Of Meeting With ETSI RES-08

P. Lowbridge gave an overview of the role of ETSI and of the presentation made to ETSI by himself and A. Stove requesting standards for automotive systems. In general the presentation was well received and there were no objections from ETSI to a standard being generated. A paper supporting the presentation was produced by A. Stove explaining the issues involved.

4. Timescales/Actions Arising From Meeting With ETSI

The subsequent actions were proposed following the meeting with ETSI:

1. A draft proposal for the automotive radar standard will be generated by the EARS group. The proposal will be based upon a similar standard which exists at 24 GHz and will follow the existing ETSI document format.
2. E. Tosato, the chairman of ETSI RES-08 will make a presentation to TC-RES in support of the standard using the supporting paper by A. Stove.
3. The EARS group will select and propose (qualified) members to represent the groups interests on the ETSI working party WP4 (Road Transport and Traffic Telematics). It was agreed that, if possible, more than one member of EARS should be included in WP4.

The presentation of the draft specification will take place at ETSI between January 30 and February 3 1995. Both the draft specification and the selection of representatives for WP4 need to be ready before that date.

5. Definition Of EARS' Link With RES-08 WP4

It is required that the representatives of the EARS group that are put forward for WP4 are existing members of ETSI. It was explained that a low level of commitment would be required from a representative (2-3 meetings over an extensive period of time). All members were therefore requested to ascertain their ETSI membership status and decide if they would be prepared to become a representative on WP4 by the next meeting.

ACTION: ALL

In the meantime P. Lowbridge would find out the identities of the existing members of WP4.

ACTION: PLL

6. Specification Issues

1. It was stressed that the proposal for the radar standard should be a radio specification and not a system specification and that interference between systems would need to be addressed at a systems level.

2. P. Lowbridge presented an overview of the draft specification which included some basic systems parameters. The parameters are reproduced in Appendix 2. It was stressed that the ETSI standard would be for type approval only. Automotive manufacturers and suppliers would still be free to generate their own specifications to suit their requirements.
3. The issue of the peak power level was raised and it was suggested that this was restrictive for pulse systems. It was explained that the current specification is based upon receiver damage levels and safety regulations. J. Flacke will find out about specifications of the DASA IMPATT system and its compliance with the draft specifications.

ACTION: JF

4. The subject of the co-existence of modulation schemes and, in particular, co-existence with spread spectrum techniques was discussed. It was the general opinion that spread spectrum systems could not be prohibited, but that their use could have an adverse effect on other systems that used the same frequency band. A study to quantify the effect of inter-system interference was suggested as well as the idea of subdividing the proposed frequency allocation into sections to separate spread spectrum systems from others using more conventional modulation.

No firm agreement with regard to the specification was reached. P. Lowbridge agreed to distribute a copy of the draft specifications to all members and observers for written comment. The results would then be collated and summarised for the next meeting.

ACTION: PLL & ALL

7. Any Other Business

None.

8. Next Meeting

The date for the next meeting was provisionally set for Tuesday 22 November at GEC-Plessey Semiconductors in Lincoln, UK.

P M Relph
Philips Research Laboratories

8

APPENDIX 1 Agenda

European Automotive Radar Standards Group

Meeting 20th September 1994

at

Marconi Radar and Control Systems, Frimley

Proposed Agenda

- 10.45AM Arrive - Coffee
- 11.00AM Welcome and Introduction to Marconi Radar
- 11.30AM Agreement Of Previous Minutes
- 11.35AM Review Of Meeting With ETSI RES-08
- 12.00PM Timescales/Actions Arising From Meeting With ETSI
- 12.30PM LUNCH**
- 1.30PM Definition of EARS' Link With RES-08 WP4
- 2.00PM Specification Issues
- 3.00PM A.O.B.
- NEXT MEETING**
- 3.30PM Close

Acting Chairman : Paul Lowbridge - GEC Plessey Semiconductors

9

APPENDIX 2 Draft Specifications

1. Test Conditions

Normal +20 - +25 °C
Extreme -10 - +55 °C
Power Supply

2. Transmitter Output Frequency

$F_{TX} = 76 - 77 \text{ GHz}$

3. Transmitter Output Power

$P_{TX} = +15 \text{ dBm peak/CW}$ ~~31.6~~ ~~43.8~~ ~~48.8~~ ~~53.8~~ ~~58.8~~ ~~63.8~~ ~~68.8~~ ~~73.8~~ ~~78.8~~ ~~83.8~~ ~~88.8~~ ~~93.8~~ ~~98.8~~ ~~103.8~~ ~~108.8~~ ~~113.8~~ ~~118.8~~ ~~123.8~~ ~~128.8~~ ~~133.8~~ ~~138.8~~ ~~143.8~~ ~~148.8~~ ~~153.8~~ ~~158.8~~ ~~163.8~~ ~~168.8~~ ~~173.8~~ ~~178.8~~ ~~183.8~~ ~~188.8~~ ~~193.8~~ ~~198.8~~ ~~203.8~~ ~~208.8~~ ~~213.8~~ ~~218.8~~ ~~223.8~~ ~~228.8~~ ~~233.8~~ ~~238.8~~ ~~243.8~~ ~~248.8~~ ~~253.8~~ ~~258.8~~ ~~263.8~~ ~~268.8~~ ~~273.8~~ ~~278.8~~ ~~283.8~~ ~~288.8~~ ~~293.8~~ ~~298.8~~ ~~303.8~~ ~~308.8~~ ~~313.8~~ ~~318.8~~ ~~323.8~~ ~~328.8~~ ~~333.8~~ ~~338.8~~ ~~343.8~~ ~~348.8~~ ~~353.8~~ ~~358.8~~ ~~363.8~~ ~~368.8~~ ~~373.8~~ ~~378.8~~ ~~383.8~~ ~~388.8~~ ~~393.8~~ ~~398.8~~ ~~403.8~~ ~~408.8~~ ~~413.8~~ ~~418.8~~ ~~423.8~~ ~~428.8~~ ~~433.8~~ ~~438.8~~ ~~443.8~~ ~~448.8~~ ~~453.8~~ ~~458.8~~ ~~463.8~~ ~~468.8~~ ~~473.8~~ ~~478.8~~ ~~483.8~~ ~~488.8~~ ~~493.8~~ ~~498.8~~ ~~503.8~~ ~~508.8~~ ~~513.8~~ ~~518.8~~ ~~523.8~~ ~~528.8~~ ~~533.8~~ ~~538.8~~ ~~543.8~~ ~~548.8~~ ~~553.8~~ ~~558.8~~ ~~563.8~~ ~~568.8~~ ~~573.8~~ ~~578.8~~ ~~583.8~~ ~~588.8~~ ~~593.8~~ ~~598.8~~ ~~603.8~~ ~~608.8~~ ~~613.8~~ ~~618.8~~ ~~623.8~~ ~~628.8~~ ~~633.8~~ ~~638.8~~ ~~643.8~~ ~~648.8~~ ~~653.8~~ ~~658.8~~ ~~663.8~~ ~~668.8~~ ~~673.8~~ ~~678.8~~ ~~683.8~~ ~~688.8~~ ~~693.8~~ ~~698.8~~ ~~703.8~~ ~~708.8~~ ~~713.8~~ ~~718.8~~ ~~723.8~~ ~~728.8~~ ~~733.8~~ ~~738.8~~ ~~743.8~~ ~~748.8~~ ~~753.8~~ ~~758.8~~ ~~763.8~~ ~~768.8~~ ~~773.8~~ ~~778.8~~ ~~783.8~~ ~~788.8~~ ~~793.8~~ ~~798.8~~ ~~803.8~~ ~~808.8~~ ~~813.8~~ ~~818.8~~ ~~823.8~~ ~~828.8~~ ~~833.8~~ ~~838.8~~ ~~843.8~~ ~~848.8~~ ~~853.8~~ ~~858.8~~ ~~863.8~~ ~~868.8~~ ~~873.8~~ ~~878.8~~ ~~883.8~~ ~~888.8~~ ~~893.8~~ ~~898.8~~ ~~903.8~~ ~~908.8~~ ~~913.8~~ ~~918.8~~ ~~923.8~~ ~~928.8~~ ~~933.8~~ ~~938.8~~ ~~943.8~~ ~~948.8~~ ~~953.8~~ ~~958.8~~ ~~963.8~~ ~~968.8~~ ~~973.8~~ ~~978.8~~ ~~983.8~~ ~~988.8~~ ~~993.8~~ ~~998.8~~ ~~1003.8~~ ~~1008.8~~ ~~1013.8~~ ~~1018.8~~ ~~1023.8~~ ~~1028.8~~ ~~1033.8~~ ~~1038.8~~ ~~1043.8~~ ~~1048.8~~ ~~1053.8~~ ~~1058.8~~ ~~1063.8~~ ~~1068.8~~ ~~1073.8~~ ~~1078.8~~ ~~1083.8~~ ~~1088.8~~ ~~1093.8~~ ~~1098.8~~ ~~1103.8~~ ~~1108.8~~ ~~1113.8~~ ~~1118.8~~ ~~1123.8~~ ~~1128.8~~ ~~1133.8~~ ~~1138.8~~ ~~1143.8~~ ~~1148.8~~ ~~1153.8~~ ~~1158.8~~ ~~1163.8~~ ~~1168.8~~ ~~1173.8~~ ~~1178.8~~ ~~1183.8~~ ~~1188.8~~ ~~1193.8~~ ~~1198.8~~ ~~1203.8~~ ~~1208.8~~ ~~1213.8~~ ~~1218.8~~ ~~1223.8~~ ~~1228.8~~ ~~1233.8~~ ~~1238.8~~ ~~1243.8~~ ~~1248.8~~ ~~1253.8~~ ~~1258.8~~ ~~1263.8~~ ~~1268.8~~ ~~1273.8~~ ~~1278.8~~ ~~1283.8~~ ~~1288.8~~ ~~1293.8~~ ~~1298.8~~ ~~1303.8~~ ~~1308.8~~ ~~1313.8~~ ~~1318.8~~ ~~1323.8~~ ~~1328.8~~ ~~1333.8~~ ~~1338.8~~ ~~1343.8~~ ~~1348.8~~ ~~1353.8~~ ~~1358.8~~ ~~1363.8~~ ~~1368.8~~ ~~1373.8~~ ~~1378.8~~ ~~1383.8~~ ~~1388.8~~ ~~1393.8~~ ~~1398.8~~ ~~1403.8~~ ~~1408.8~~ ~~1413.8~~ ~~1418.8~~ ~~1423.8~~ ~~1428.8~~ ~~1433.8~~ ~~1438.8~~ ~~1443.8~~ ~~1448.8~~ ~~1453.8~~ ~~1458.8~~ ~~1463.8~~ ~~1468.8~~ ~~1473.8~~ ~~1478.8~~ ~~1483.8~~ ~~1488.8~~ ~~1493.8~~ ~~1498.8~~ ~~1503.8~~ ~~1508.8~~ ~~1513.8~~ ~~1518.8~~ ~~1523.8~~ ~~1528.8~~ ~~1533.8~~ ~~1538.8~~ ~~1543.8~~ ~~1548.8~~ ~~1553.8~~ ~~1558.8~~ ~~1563.8~~ ~~1568.8~~ ~~1573.8~~ ~~1578.8~~ ~~1583.8~~ ~~1588.8~~ ~~1593.8~~ ~~1598.8~~ ~~1603.8~~ ~~1608.8~~ ~~1613.8~~ ~~1618.8~~ ~~1623.8~~ ~~1628.8~~ ~~1633.8~~ ~~1638.8~~ ~~1643.8~~ ~~1648.8~~ ~~1653.8~~ ~~1658.8~~ ~~1663.8~~ ~~1668.8~~ ~~1673.8~~ ~~1678.8~~ ~~1683.8~~ ~~1688.8~~ ~~1693.8~~ ~~1698.8~~ ~~1703.8~~ ~~1708.8~~ ~~1713.8~~ ~~1718.8~~ ~~1723.8~~ ~~1728.8~~ ~~1733.8~~ ~~1738.8~~ ~~1743.8~~ ~~1748.8~~ ~~1753.8~~ ~~1758.8~~ ~~1763.8~~ ~~1768.8~~ ~~1773.8~~ ~~1778.8~~ ~~1783.8~~ ~~1788.8~~ ~~1793.8~~ ~~1798.8~~ ~~1803.8~~ ~~1808.8~~ ~~1813.8~~ ~~1818.8~~ ~~1823.8~~ ~~1828.8~~ ~~1833.8~~ ~~1838.8~~ ~~1843.8~~ ~~1848.8~~ ~~1853.8~~ ~~1858.8~~ ~~1863.8~~ ~~1868.8~~ ~~1873.8~~ ~~1878.8~~ ~~1883.8~~ ~~1888.8~~ ~~1893.8~~ ~~1898.8~~ ~~1903.8~~ ~~1908.8~~ ~~1913.8~~ ~~1918.8~~ ~~1923.8~~ ~~1928.8~~ ~~1933.8~~ ~~1938.8~~ ~~1943.8~~ ~~1948.8~~ ~~1953.8~~ ~~1958.8~~ ~~1963.8~~ ~~1968.8~~ ~~1973.8~~ ~~1978.8~~ ~~1983.8~~ ~~1988.8~~ ~~1993.8~~ ~~1998.8~~ ~~2003.8~~ ~~2008.8~~ ~~2013.8~~ ~~2018.8~~ ~~2023.8~~ ~~2028.8~~ ~~2033.8~~ ~~2038.8~~ ~~2043.8~~ ~~2048.8~~ ~~2053.8~~ ~~2058.8~~ ~~2063.8~~ ~~2068.8~~ ~~2073.8~~ ~~2078.8~~ ~~2083.8~~ ~~2088.8~~ ~~2093.8~~ ~~2098.8~~ ~~2103.8~~ ~~2108.8~~ ~~2113.8~~ ~~2118.8~~ ~~2123.8~~ ~~2128.8~~ ~~2133.8~~ ~~2138.8~~ ~~2143.8~~ ~~2148.8~~ ~~2153.8~~ ~~2158.8~~ ~~2163.8~~ ~~2168.8~~ ~~2173.8~~ ~~2178.8~~ ~~2183.8~~ ~~2188.8~~ ~~2193.8~~ ~~2198.8~~ ~~2203.8~~ ~~2208.8~~ ~~2213.8~~ ~~2218.8~~ ~~2223.8~~ ~~2228.8~~ ~~2233.8~~ ~~2238.8~~ ~~2243.8~~ ~~2248.8~~ ~~2253.8~~ ~~2258.8~~ ~~2263.8~~ ~~2268.8~~ ~~2273.8~~ ~~2278.8~~ ~~2283.8~~ ~~2288.8~~ ~~2293.8~~ ~~2298.8~~ ~~2303.8~~ ~~2308.8~~ ~~2313.8~~ ~~2318.8~~ ~~2323.8~~ ~~2328.8~~ ~~2333.8~~ ~~2338.8~~ ~~2343.8~~ ~~2348.8~~ ~~2353.8~~ ~~2358.8~~ ~~2363.8~~ ~~2368.8~~ ~~2373.8~~ ~~2378.8~~ ~~2383.8~~ ~~2388.8~~ ~~2393.8~~ ~~2398.8~~ ~~2403.8~~ ~~2408.8~~ ~~2413.8~~ ~~2418.8~~ ~~2423.8~~ ~~2428.8~~ ~~2433.8~~ ~~2438.8~~ ~~2443.8~~ ~~2448.8~~ ~~2453.8~~ ~~2458.8~~ ~~2463.8~~ ~~2468.8~~ ~~2473.8~~ ~~2478.8~~ ~~2483.8~~ ~~2488.8~~ ~~2493.8~~ ~~2498.8~~ ~~2503.8~~ ~~2508.8~~ ~~2513.8~~ ~~2518.8~~ ~~2523.8~~ ~~2528.8~~ ~~2533.8~~ ~~2538.8~~ ~~2543.8~~ ~~2548.8~~ ~~2553.8~~ ~~2558.8~~ ~~2563.8~~ ~~2568.8~~ ~~2573.8~~ ~~2578.8~~ ~~2583.8~~ ~~2588.8~~ ~~2593.8~~ ~~2598.8~~ ~~2603.8~~ ~~2608.8~~ ~~2613.8~~ ~~2618.8~~ ~~2623.8~~ ~~2628.8~~ ~~2633.8~~ ~~2638.8~~ ~~2643.8~~ ~~2648.8~~ ~~2653.8~~ ~~2658.8~~ ~~2663.8~~ ~~2668.8~~ ~~2673.8~~ ~~2678.8~~ ~~2683.8~~ ~~2688.8~~ ~~2693.8~~ ~~2698.8~~ ~~2703.8~~ ~~2708.8~~ ~~2713.8~~ ~~2718.8~~ ~~2723.8~~ ~~2728.8~~ ~~2733.8~~ ~~2738.8~~ ~~2743.8~~ ~~2748.8~~ ~~2753.8~~ ~~2758.8~~ ~~2763.8~~ ~~2768.8~~ ~~2773.8~~ ~~2778.8~~ ~~2783.8~~ ~~2788.8~~ ~~2793.8~~ ~~2798.8~~ ~~2803.8~~ ~~2808.8~~ ~~2813.8~~ ~~2818.8~~ ~~2823.8~~ ~~2828.8~~ ~~2833.8~~ ~~2838.8~~ ~~2843.8~~ ~~2848.8~~ ~~2853.8~~ ~~2858.8~~ ~~2863.8~~ ~~2868.8~~ ~~2873.8~~ ~~2878.8~~ ~~2883.8~~ ~~2888.8~~ ~~2893.8~~ ~~2898.8~~ ~~2903.8~~ ~~2908.8~~ ~~2913.8~~ ~~2918.8~~ ~~2923.8~~ ~~2928.8~~ ~~2933.8~~ ~~2938.8~~ ~~2943.8~~ ~~2948.8~~ ~~2953.8~~ ~~2958.8~~ ~~2963.8~~ ~~2968.8~~ ~~2973.8~~ ~~2978.8~~ ~~2983.8~~ ~~2988.8~~ ~~2993.8~~ ~~2998.8~~ ~~3003.8~~ ~~3008.8~~ ~~3013.8~~ ~~3018.8~~ ~~3023.8~~ ~~3028.8~~ ~~3033.8~~ ~~3038.8~~ ~~3043.8~~ ~~3048.8~~ ~~3053.8~~ ~~3058.8~~ ~~3063.8~~ ~~3068.8~~ ~~3073.8~~ ~~3078.8~~ ~~3083.8~~ ~~3088.8~~ ~~3093.8~~ ~~3098.8~~ ~~3103.8~~ ~~3108.8~~ ~~3113.8~~ ~~3118.8~~ ~~3123.8~~ ~~3128.8~~ ~~3133.8~~ ~~3138.8~~ ~~3143.8~~ ~~3148.8~~ ~~3153.8~~ ~~3158.8~~ ~~3163.8~~ ~~3168.8~~ ~~3173.8~~ ~~3178.8~~ ~~3183.8~~ ~~3188.8~~ ~~3193.8~~ ~~3198.8~~ ~~3203.8~~ ~~3208.8~~ ~~3213.8~~ ~~3218.8~~ ~~3223.8~~ ~~3228.8~~ ~~3233.8~~ ~~3238.8~~ ~~3243.8~~ ~~3248.8~~ ~~3253.8~~ ~~3258.8~~ ~~3263.8~~ ~~3268.8~~ ~~3273.8~~ ~~3278.8~~ ~~3283.8~~ ~~3288.8~~ ~~3293.8~~ ~~3298.8~~ ~~3303.8~~ ~~3308.8~~ ~~3313.8~~ ~~3318.8~~ ~~3323.8~~ ~~3328.8~~ ~~3333.8~~ ~~3338.8~~ ~~3343.8~~ ~~3348.8~~ ~~3353.8~~ ~~3358.8~~ ~~3363.8~~ ~~3368.8~~ ~~3373.8~~ ~~3378.8~~ ~~3383.8~~ ~~3388.8~~ ~~3393.8~~ ~~3398.8~~ ~~3403.8~~ ~~3408.8~~ ~~3413.8~~ ~~3418.8~~ ~~3423.8~~ ~~3428.8~~ ~~3433.8~~ ~~3438.8~~ ~~3443.8~~ ~~3448.8~~ ~~3453.8~~ ~~3458.8~~ ~~3463.8~~ ~~3468.8~~ ~~3473.8~~ ~~3478.8~~ ~~3483.8~~ ~~3488.8~~ ~~3493.8~~ ~~3498.8~~ ~~3503.8~~ ~~3508.8~~ ~~3513.8~~ ~~3518.8~~ ~~3523.8~~ ~~3528.8~~ ~~3533.8~~ ~~3538.8~~ ~~3543.8~~ ~~3548.8~~ ~~3553.8~~ ~~3558.8~~ ~~3563.8~~ ~~3568.8~~ ~~3573.8~~ ~~3578.8~~ ~~3583.8~~ ~~3588.8~~ ~~3593.8~~ ~~3598.8~~ ~~3603.8~~ ~~3608.8~~ ~~3613.8~~ ~~3618.8~~ ~~3623.8~~ ~~3628.8~~ ~~3633.8~~ ~~3638.8~~ ~~3643.8~~ ~~3648.8~~ ~~3653.8~~ ~~3658.8~~ ~~3663.8~~ ~~3668.8~~ ~~3673.8~~ ~~3678.8~~ ~~3683.8~~ ~~3688.8~~ ~~3693.8~~ ~~3698.8~~ ~~3703.8~~ ~~3708.8~~ ~~3713.8~~ ~~3718.8~~ ~~3723.8~~ ~~3728.8~~ ~~3733.8~~ ~~3738.8~~ ~~3743.8~~ ~~3748.8~~ ~~3753.8~~ ~~3758.8~~ ~~3763.8~~ ~~3768.8~~ ~~3773.8~~ ~~3778.8~~ ~~3783.8~~ ~~3788.8~~ ~~3793.8~~ ~~3798.8~~ ~~3803.8~~ ~~3808.8~~ ~~3813.8~~ ~~3818.8~~ ~~3823.8~~ ~~3828.8~~ ~~3833.8~~ ~~3838.8~~ ~~3843.8~~ ~~3848.8~~ ~~3853.8~~ ~~3858.8~~ ~~3863.8~~ ~~3868.8~~ ~~3873.8~~ ~~3878.8~~ ~~3883.8~~ ~~3888.8~~ ~~3893.8~~ ~~3898.8~~ ~~3903.8~~ ~~3908.8~~ ~~3913.8~~ ~~3918.8~~ ~~3923.8~~ ~~3928.8~~ ~~3933.8~~ ~~3938.8~~ ~~3943.8~~ ~~3948.8~~ ~~3953.8~~ ~~3958.8~~ ~~3963.8~~ ~~3968.8~~ ~~3973.8~~ ~~3978.8~~ ~~3983.8~~ ~~3988.8~~ ~~3993.8~~ ~~3998.8~~ ~~4003.8~~ ~~4008.8~~ ~~4013.8~~ ~~4018.8~~ ~~4023.8~~ ~~4028.8~~ ~~4033.8~~ ~~4038.8~~ ~~4043.8~~ ~~4048.8~~ ~~4053.8~~ ~~4058.8~~ ~~4063.8~~ ~~4068.8~~ ~~4073.8~~ ~~4078.8~~ ~~4083.8~~ ~~4088.8~~ ~~4093.8~~ ~~4098.8~~ ~~4103.8~~ ~~4108.8~~ ~~4113.8~~ ~~4118.8~~ ~~4123.8~~ ~~4128.8~~ ~~4133.8~~ ~~4138.8~~ ~~4143.8~~ ~~4148.8~~ ~~4153.8~~ ~~4158.8~~ ~~4163.8~~ ~~4168.8~~ ~~4173.8~~ ~~4178.8~~ ~~4183.8~~ ~~4188.8~~ ~~4193.8~~ ~~4198.8~~ ~~4203.8~~ ~~4208.8~~ ~~4213.8~~ ~~4218.8~~ ~~4223.8~~ ~~4228.8~~ ~~4233.8~~ ~~4238.8~~ ~~4243.8~~ ~~4248.8~~ ~~4253.8~~ ~~4258.8~~ ~~4263.8~~ ~~4268.8~~ ~~4273.8~~ ~~4278.8~~ ~~4283.8~~ ~~4288.8~~ ~~4293.8~~ ~~4298.8~~ ~~4303.8~~ ~~4308.8~~ ~~4313.8~~ ~~4318.8~~ ~~4323.8~~ ~~4328.8~~ ~~4333.8~~ ~~4338.8~~ ~~4343.8~~ ~~4348.8~~ ~~4353.8~~ ~~4358.8~~ ~~4363.8~~ ~~4368.8~~ ~~4373.8~~ ~~4378.8~~ ~~4383.8~~ ~~4388.8~~ ~~4393.8~~ ~~4398.8~~ ~~4403.8~~ ~~4408.8~~ ~~4413.8~~ ~~4418.8~~ ~~4423.8~~ ~~4428.8~~ ~~4433.8~~ ~~4438.8~~ ~~4443.8~~ ~~4448.8~~ ~~4453.8~~ ~~4458.8~~ ~~4463.8~~ ~~4468.8~~ ~~4473.8~~ ~~4478.8~~ ~~4483.8~~ ~~4488.8~~ ~~4493.8~~ ~~4498.8~~ ~~4503.8~~ ~~4508.8~~ ~~4513.8~~ ~~4518.8~~ ~~4523.8~~ ~~4528.8~~ ~~4533.8~~ ~~4538.8~~ ~~4543.8~~ ~~4548.8~~ ~~4553.8~~ ~~4558.8~~ ~~4563.8~~ ~~4568.8~~ ~~4573.8~~ ~~4578.8~~ ~~4583.8~~ ~~4588.8~~ ~~4593.8~~ ~~4598.8~~ ~~4603.8~~ ~~4608.8~~ ~~4613.8~~ ~~4618.8~~ ~~4623.8~~ ~~4628.8~~ ~~4633.8~~ ~~4638.8~~ ~~4643.8~~ ~~4648.8~~ ~~4653.8~~ ~~4658.8~~ ~~4663.8~~ ~~4668.8~~ ~~4673.8~~ ~~4678.8~~ ~~4683.8~~ ~~4688.8~~ ~~4693.8~~ ~~4698.8~~ ~~4703.8~~ ~~4708.8~~ ~~4713.8~~ ~~4718.8~~ ~~4723.8~~ ~~4728.8~~ ~~4733.8~~ ~~4738.8~~ ~~4743.8~~ ~~4748.8~~ ~~4753.8~~ ~~4758.8~~ ~~4763.8~~ ~~4768.8~~ ~~4773.8~~ ~~4778.8~~ ~~4783.8~~ ~~4788.8~~ ~~4793.8~~ ~~4798.8~~ ~~4803.8~~ ~~4808.8~~ ~~4813.8~~ ~~4818.8~~ ~~4823.8~~ ~~4828.8~~ ~~4833.8~~ ~~4838.8~~ ~~4843.8~~ ~~4848.8~~ ~~4853.8~~ ~~4858.8~~ ~~4863.8~~ ~~4868.8~~ ~~4873.8~~ ~~4878.8~~ ~~4883.8~~ ~~4888.8~~ ~~4893.8~~ ~~4898.8~~ ~~4903.8~~ ~~4908.8~~ ~~4913.8~~ ~~4918.8~~ ~~4923.8~~ ~~4928.8~~ ~~4933.8~~ ~~4938.8~~ ~~4943.8~~ ~~4948.8~~ ~~4953.8~~ ~~4958.8~~ ~~4963.8~~ ~~4968.8~~ ~~4973.8~~ ~~4978.8~~ ~~4983.8~~ ~~4988.8~~ ~~4993.8~~ ~~4998.8~~ ~~5003.8~~ ~~5008.8~~ ~~5013.8~~ ~~5018.8~~ ~~5023.8~~ ~~5028.8~~ ~~5033.8~~ ~~5038.8~~ ~~5043.8~~ ~~5048.8~~ ~~5053.8~~ ~~5058.8~~ ~~5063.8~~ ~~5068.8~~ ~~5073.8~~ ~~5078.8~~ ~~5083.8~~ ~~5088.8~~ ~~50~~

Bundesamt für Post und Telekommunikation



T 16179

AAMA
TECHNICAL LIBRARY

BAPT 211 ZV 3/2099

Vorläufige Zulassungsvorschrift für Funkanlagen des nichtnavigatorischen Ortungsfunkdienstes in der Verwendung als Bewegungsmelder kleiner Leistung

Ausgabe: Juni 1992

2. Entwurf

Herausgegeben vom Bundesministerium für Post und Telekommunikation
5300 Bonn 1

Bearbeitet vom Bundesamt für Post und Telekommunikation
6500 Mainz 1

Diese Zulassungsvorschrift umfaßt 15 Seiten
Dazu kommen - Anlagen mit insgesamt - Seiten

Diese Zulassungsvorschrift ist urheberrechtlich geschützt.
Abdruck und Vervielfältigung - auch auszugsweise - nur mit vorheriger Einwilligung des BAPT

TITLE
[

FEDERAL BUREAU FOR MAIL AND TELECOMMUNICATION

BAPT 211 ZV 3/2099

TEMPORARY LICENSING REGULATION FOR RADIO INSTALLATIONS OF THE NON-
NAVIGATIONAL LOCATING RADIO SERVICE USED AS MOTION TRANSMITTED OF SMALL
OUTPUT

Edition: June 1992

Second Draft

Published by the Federal Ministry for Mail and Telecommunication
5300 Bonn, 1, Germany

Edited by the Federal Bureau for Mail and Telecommunication
6500 Mainz 1, Germany

This Licensing Regulation comprises 15 pages, plus attachments.

The Licensing Regulation is under copyright protection. Copying, even
in excerpts, is only permitted with prior consent from the BAPT.

FEDERAL BUREAU FOR MAIL AND TELECOMMUNICATION

BAPT 211 ZV 3/2099

TEMPORARY LICENSING REGULATION FOR RADIO INSTALLATIONS OF THE NON-
NAVIGATIONAL LOCATING RADIO SERVICE USED AS MOTION TRANSMITTED OF SMALL
OUTPUT

Edition: June 1992

Second Draft

Published by the Federal Ministry for Mail and Telecommunication
5300 Bonn, 1, Germany

Edited by the Federal Bureau for Mail and Telecommunication
6500 Mainz 1, Germany

This Licensing Regulation comprises 15 pages, plus attachments.

The Licensing Regulation is under copyright protection. Copying, even
in excerpts, is only permitted with prior consent from the BAPT.

TABLE OF CONTENTS

- 1. General background
 - 1.1 Definition
 - 1.2 Range of validity
 - 1.3 Reference documents
- 2. Technical prerequisites
 - 2.1 General
 - 2.1.1 Frequency ranges
 - 2.1.2 Types of transmission
 - 2.2 Test conditions
 - 2.2.1 Testing voltage source
 - 2.2.2 Standard test conditions
 - 2.2.2.1 Temperature and air humidity
 - 2.2.2.2 Voltage source
 - 2.2.3 Extreme test conditions
 - 2.2.3.1 Temperature
 - 2.2.3.2 Voltage fluctuations
 - 2.2.4 Conducting the test under extreme test conditions
 - 2.2.5 Test signal
 - 2.2.6 Measurement connections
 - 2.3 Measurement arrangements
 - 2.3.1 Measuring stations
 - 2.3.1.1 Measurements ranging between 9 kHz and 30 MHz
 - 2.3.1.2 Measurements ranging between 30 MHz and 1 GHz
 - 2.3.1.3 Measurements above 1 GHz
 - 2.3.2 Test antenna
 - 2.4 Measuring inaccuracies

3. Transmitter

3.1 Frequency deviation

3.1.1 Definition

3.1.2 Measuring procedure

3.1.3 Limit value

3.2 Equivalent isotope radiation performance

3.2.1 Definition

3.2.2 Measuring procedure

3.2.3 Limit values

3.3 Seized band with

3.3.1 Definition

3.3.2 Measuring procedure

3.3.3 Limit values

3.4 Extended emissions

3.4.1 Definition

3.4.2 Measuring procedure

3.4.3 Limit values

3.5 Out-of-band emission

3.5.1 Definition

3.5.2 Measuring procedure

3.5.3 Limit value

4. Receiver Interference Radiation

4.1 Definition

4.2 Measuring procedure

4.3 Limit values

5. Other Requirements

5.1 Radio interference voltage in the frequency range 10 kHz ... 30 MHz

5.1.1 Definition

5.1.2 Measuring procedure and measuring instruments

5.1.3 Limit value course

5.2 Magnetic interference field strength

5.2.1 Definition

5.2.2 Measuring procedure

5.2.3 Limit values

1. GENERAL BACKGROUND

1.1 Definition

Motion transmitters of small output are stationary or mobile radio installations of non-navigational locating radio service which have the purpose of recording distances / intervals to objects, making speed measurements, traffic counts, serve areal protection. etc. They generally operated on the basis of the Doppler effect or similar procedures.

1.2 Range of Validity

This licensing regulation outlines the minimum requirements for radio installations of the non-navigational locating radio service used as motion transmitters. As proof for compliance with this regulation, an approval as per the "Ordinance (TKZulV) regarding the licensing of telecommunication devices" is needed. The technical tests needed for that can be conducted by the Federal Bureau of Telecommunication Licenses. For the acknowledgment of such tests by other parties refer to # 15 TKZulV. Application for licensing must be addressed to BZR, Talstrasse 34-42, P.O. Box 3050, 6600 Saarbruecken, Germany.

The license does not cover electric devices (eg, data processing equipment, chargers, etc) which are not part of the radio installation. To these devices apply the anti-jamming regulations of the VDE standard DIN VDE 0875 and DIN VDE 0871, limit value class B, and the general requirements of the law on the operation of high-frequency devices in

the edition valid at the time of the license. To a protection of people through the direct and indirect impact of the electric, magnetic and electromagnetic fields apply the limit values of the DIN VDE 0848, Part 2 (draft Oct. 1991).

The test objective is not the electric and mechanic safety of the radio devices. Responsible for the mechanical and electric safety are the pertinent regulations, eg, the law of technical work tools (device safety legislation) of June 24, 1968.

Construction and operation of the radio installations described in 1.1 are subject to approval, refer to # 1 and 2 of the law of telecommunication systems. Based on the general requirements published in the official bulletin of the Federal Ministry for Mail and Telecommunication, the radio installations can be erected and operated in the respectively valid versions. Motion transmitters of small performances carry the additional marking "EB" This licensing regulation replaced the FTZ 17 TR 2099, edited May 1989.

Inquiries regarding a clear understanding of this regulation have to be addressed to:

The Federal Bureau for Mail and Telecommunication, Tempeler Rd.
2-4 W-6500 Mainz, Germany.

1.3 Reference Documents

This licensing regulation refers to presently valid recommenda-

tions, guidelines and regulations. Following is a list of the most important documents:

- [1] ERC Report 3 of the CEPT, ed. Feb. 1991.
- [2] DIN VDE 0876, Part 1
- [3] DIN VDE 0877

2. TECHNICAL REQUIREMENTS

2.1 General

2.1.1 Frequency Ranges

- a) 2400 ... 2500 MHz 1
- b) 24.00 ... 24.24 GHz 1
- c) 61.00 ... 61.50 GHz 1
- d) 76.00 ... 77.00 GHz 2

Footnotes:

- 1\ The frequency is an ISU frequency range which is also used by other radio services and high frequency devices.
 - 2\ Permitted only for distance warning labels (anti-collision radar devices) .
-

2.1.2 Types of Transmission

Frequency and amplitude modulated emissions, pulse emissions.

2.2 Test Conditions

2.2.1 Testing Voltage Source

During testing, the radio installation must be supplied by a

testing voltage source capable of keeping the limit values indicated in points 2.2.4 and 2.2.5.

The internal resistance of the testing voltage source must be so small that, with regard to a distortion of the test results, it is negligible.

During testing the radio installation, the voltage of the testing voltage source must be kept within a tolerance of $\pm 3\%$ related to the relative voltage level at the beginning of each measurement.

2.2.2 Standard Conditions

2.2.2.1 Temperature and Air Humidity

The standard temperature and air humidity during the test must lie in the range:

Temperature: + 15°C to 35°C

Air humidity: 20% to 75%

2.2.2.2 Voltage Source

To the technical test of the radio installation applies as standard operational supply voltage:

- a) with lead accumulator 1.1 times the nominal voltage
- b) with other accumulator/battery types, the voltage of a new kind of accumulator/battery of the type indicated by the manufacturer of the device, occurring under operational load

c) with line-power the nominal voltage indicated by the manufacturer. The frequency of the alternate voltage must not exceed a tolerance of $\pm 2\%$ from the given nominal frequency.

2.2.3 Extreme Test Conditions

2.2.3.1 Temperature

Tests of the radio installation under extreme temperatures must be conducted as indicated in point 2. The temperature limits are set at -10°C and $+55^{\circ}\text{C}$.

2.2.3.2 Voltage Fluctuations

Tests of the radio installation under extreme line fluctuations are conducted by applying alternate voltage with a deviation of $\pm 10\%$ from the required line-power voltage.

When the radio installation is to be battery-powered, the nominal voltage must be 1.3 and 0.9 times the value of the required battery nominal voltage (12 V; 24 V) during testing of the radio installation under extreme conditions.

2.2.4 Conducting the Test Under Extreme Test Conditions

During temperature stabilization in the test chamber, the radio installation must be turned off. Before conducting the test at increased temperature, the temperature inside the test chamber, where the installation is located, must be in balance. The radio installation must then be switched off for half an hour and transmit at full force.

After that, the radio installation must stay within the tolerance range of its parameters.

For the test at extremely low temperatures, the radio device must be inside the test test chamber within balanced temperature. Then it is switched for one minute to "stand-by."

2.2.5 Test Signal

D-TS3: A special signal that has been agreed upon by the manufacturer and the test authority. All the details of the test signals must be noted down in the test report.

2.2.6 Measurement Connections

For the type test, suitable connections (outlets?) must be provided by the manufacturer and licence applicant on the device to be tested. This is to be done after consultation with the test authority.

2.3 Measurement Arrangements

2.3.1 Measuring Stations

2.3.1.1. Measurements Ranging Between 9 MHz and 30 MHz

A suitable measuring station is set up in [5].

2.3.1.2 Measurements Ranging Between 30 MHz and 1 GHz

The floor of the measuring station must be a metallic plane (eg. a wire mesh) at least 5 m wide and 15 m long. The tested device is placed on one side of the surface at a distance of 2.5 m from the edges on a table turning at a height of 1.5 m by 360 degrees in a horizontal plane.

For the part of the radio device which in normal operation is held in the hand or on the body, the [test] device consists of a plastic tube filled with salt water (9 g NaCl/liter). This tube has a length of 1.5 m and a clear width of 10 +/- 0.5 cm. Its upper end is closed off by a metal plate of 15 m diameter which on its lower side, is wetted by salt water. The tested device is placed on the metal place with its largest surface.

When the device is to be mounted in a vehicle, the test device consists of a non-conductive material.

The test antenna is placed on the metallic surface at a 10 m distance from the tested device.

2.3.1.3 Measurements above 1 GHz

The measuring station must be on a sufficiently plane surface. In the center of this surface, the tested device is placed on a non-conductive table turning in the horizontal at a height of 1.5 m by 360 degrees. The measuring station must be large enough for the test antenna to be placed at a distance from the tested device determined by the opening diameter of the test antenna, the frequency to be measured and the high-frequency output to be measured. The selected distance has to be noted in the test report.

2.3.2 Test Antenna

The test antenna measured the radiation properties of the tested device as well as the radiation field of a comparative antenna required

for calibration purposes. The test antenna is mounted on a support which permits its use either in horizontal or in vertical polarization. The electric center of the antenna must be adjustable at a height of 1 m to max. 4 m above ground. Hereby must be observed that the distance between the lower dipole end and the floor is no less than 30 cm. It is preferable to use test antennas with a clear directional effect.

In the axis of the measurement, the test antenna should not extend 20% of the measuring distance.

Notes regarding the Use of the Test Antenna

When using the test antenna, the following is to be observed:

a) For measurements of the electric field strength in the frequency range above 1 GHz, the antenna should be calibrated on an isotope sender antenna.

b) For measurements of the electric field strength in the frequency range 25 MHz to 1000 MHz the test antenna should be a $\lambda/2$ -dipole, adjusted to the test frequency is a shortened antenna related to a $\lambda/2$ -dipole, if possible with clear directional effect and with a respective adjustment power-line at the foot of the antenna.

c) In the frequency range 25 to 300 MHz, the height of the electric center of the test antenna is fixed at 1.5 m. With the use of the $\lambda/2$ -dipoles, however, the 30 cm clearance from the ground must be observed. The resulting greater heights must be noted down in the test report.

2.3.3 Comparative Antenna

The comparative antenna for the frequency range above 1 GHz should be calibrated on an isotope antenna.

The comparative antenna for the frequency range 25 to 1000 MHz must be a lambda/2-dipole, adjusted to the respective frequency, or a shortened antenna calibrated to a lambda/2-dipole.

The electric center of this antenna must be in agreement with the reference point of the tested device. The reference point of the tested device is the antenna. The distance between the lower dipole end and the floor must be no less than 30 cm.

2.4 Measuring Inaccuracies

The error limit of the used measuring instruments and measurement arrangements have no impact on the limit values.

High frequency	1 x 10 ⁻⁷
High frequency output	0.75 dB
Interfering emission	6 dB
Alternate current	3%
Direct current	3%
Temperature	1 degree

3. TRANSMITTER

3.1 Frequency Deviation

3.1.1 Definition

The frequency deviation is the difference between the established carrier frequency and its nominal value.

3.1.2 Measuring Procedure

The carrier frequency must be measured without modulation 3). The tests must be conducted under normal conditions (see 2.2.2) and extreme conditions (see 2.2.3 and 2.2.4) and at min. and max. radio output.

-
- 3) If necessary, the modulation or assessment of the carrier frequency is to be provided by the manufacturer through the introduction of the test signal S-M3.
-

3.1.3 Limit Value

The frequency deviation must be such that the emission does not exceed the frequency range described in point 2.1.1.

3.2 Equivalent Isotope Radiation Performance (EISP)

3.2.1 Definition

The equivalent isotope radiation performance is the product of a performance introduced to an antenna and the gain of this antenna in a given direction, related to an isotope antenna. It is measured with an unmodulated transmitter 4).

- 4) The equivalent isotope radiation performance of pulse-modulated transmitters is the peak performance (PEP). If the pulse modulation cannot be turned off, the peak performance is calculated from the medium radiation performance of the medium high frequency output.
-

3.2.2 Measuring Process

At the measuring station, which has to be in compliance with the conditions described in 2.3.1.3, the transmitter to be tested is placed in the center of the test stand so that the permanently installed or attached antenna is in vertical position. Any secondary facilities, including cable connections, have to be arranged in vertical position.

The device to be tested must be operated unmodulated. The measurement receiver must be adjusted to the operational frequency of the tested transmitter. The antenna of the tested device or the tested device itself and the test antenna must be set in such a way that the max. high frequency voltage of the received signal is indicated.

Then the tested device must be replaced by a comparative antenna, such as described in section 2.33. The high frequency of the connected measurement transmitter is set so that the measurement receiver indicates the same level as before. The radiation performance is then corresponding to the performance at the comparative antenna, whereby the correction factor and gain of the latter must be taken into account.